# Engineering Change Notice

## ECN Category
- Supplemental
- Direct Revision
- Change ECN
- Temporary
- Standby
- Supersede
- Cancel/Void

## Originator's Name, Organization, MSIN, and Telephone No.
- C.E. Swenson, MHM Design Authority, CSB Engineering, S8-07, 376-0288

## ECN 1.01

### ECN Category
- Supplemental
- Direct Revision
- Change ECN
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- Cancel/Void

### Originator's Name, Organization, MSIN, and Telephone No.
- C.E. Swenson, MHM Design Authority, CSB Engineering, S8-07, 376-0288

### USG Required?
- Yes

### Date
- 10/6/00

### Project Title/No./Work Order No.
- CSB Sub-Project
- SNF-6448, Rev. 0

### Related ECN No(s).
- N/A

### Related PO No.
- N/A

### Description of Change
- Results from the field verification walkdown for the Multi-Canister Overpack Handling Machine (MHM) has been added.

### Justification (mark one)
- Criteria Change
- Environmental
- As-Found
- Design Improvement
- Construct Error/Omission
- Facility Deactivation
- Design Error/Omission

### Justification Details
- Required by AP EN-6-012 and verification/correction of vendor as-built drawings required before conversion to Hanford H-2 drawings.

### Distribution (include name, MSIN, and no. of copies)
- Bazinet, G. D. S8-06 CSB Engineering Records (2) S8-05 (H)
- Garrison, R. C. S8-07
- Garvin, L. J. S8-07
- Medford, D. W. X4-01
- Moss, S. S. S8-07
- Swenson, C. E. S8-07

---

Note: The walkdown results were peer-reviewed and incorporated into the drawings converted from vendor to Hanford drawings on EDT-629048.

---

A-7900-013-2 (05/06) GEP095
### ENGINEERING CHANGE NOTICE

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>[X] Yes</td>
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#### Additional Savings

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<tr>
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#### Improvement

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#### Change Impact Review

Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

### SDDDD

- Functional Design Criteria
- Operating Specification
- Criticality Specification
- Conceptual Design Report
- Equipment Spec.
- Const. Spec.
- Procurement Spec.
- Vendor Information
- OM Manual
- FSARS/SAR
- Safety Equipment List
- Radiation Work Permit
- Environmental Impact Statement
- Environmental Report
- Environmental Permit

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<tr>
<td>Tank Calibration Manual</td>
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<td>Health Physics Procedure</td>
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<td>Spares Multiple Unit Listing</td>
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<td>Test Procedure/Specification</td>
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<td>Component Index</td>
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<tr>
<td>ASME Coded Item</td>
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<tr>
<td>Computer Software</td>
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<td>Electric Circuit Schedule</td>
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<tr>
<td>ICR5 Procedure</td>
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<tr>
<td>Process Control Manual/Plan</td>
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<tr>
<td>Process Flow Chart</td>
</tr>
<tr>
<td>Purchase Request</td>
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<td>Tabler File</td>
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#### 20. Other Affected Documents

- (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

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<thead>
<tr>
<th>Document Number/Revision</th>
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- N/A

#### 21. Approvals

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<tr>
<th>Signature</th>
<th>Date</th>
<th>Signature</th>
<th>Date</th>
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<tbody>
<tr>
<td>CSB Design Authority</td>
<td>C. E. Swenson</td>
<td>10/4/00</td>
<td></td>
</tr>
<tr>
<td>Cog Eng</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cog Mgr</td>
<td>G. D. Bazinet</td>
<td>10/2/00</td>
<td></td>
</tr>
<tr>
<td>QA</td>
<td>S. S. Moss</td>
<td>10/9/00</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>L. J. Garvin</td>
<td>10/10/00</td>
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**DEPARTMENT OF ENERGY**

Signature or a Control Number that tracks the Approval Signature: N/A

ADDITIONAL
As-Built Verification Plan Spent Nuclear Fuel Canister Storage Building MCO Handling Machine

Project No: W-379  Document Type: RPT  Division: SNF  Total Pages: 18

C. E. Swenson  FH

Date Published
October 2000

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington

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<td>1</td>
<td>ECN-654499</td>
<td>G. D. Bazinet</td>
</tr>
<tr>
<td>RS</td>
<td>Results from the field verification walkthrough for the Multi-Canister Overpack Handling Machine (MHM) has been added.</td>
<td></td>
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As-Built Verification Plan
Spent Nuclear Fuel
Canister Storage Building
MCO Handling Machine

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
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AS-BUILT VERIFICATION PLAN

SPENT NUCLEAR FUEL

CANISTER STORAGE BUILDING

MCO HANDLING MACHINE

Rev 0
February 11, 2000

Approved:

C.E. Swenson

A.S. Daughtridge, Jr.
CSB MHM AS-BUILT VERIFICATION PLAN

1.0 INTRODUCTION

This as-built verification plan outlines the methodology and responsibilities that will be implemented during the as-built field verification activity for the Canister Storage Building (CSB) MCO HANDLING MACHINE (MHM). This as-built verification plan covers the MECHANICAL construction (MOWAT) portion AND THE ELECTRICAL PORTION of the CONSTRUCTION PERFORMED BY POWER CITY UNDER CONTRACT TO MOWAT.

The as-built verifications will be performed in accordance Administrative Procedure AP 6-012-00, Spent Nuclear Fuel Project As-Built Verification Plan Development Process, revision 0. The results of the verification walkdown will be documented in a verification walkdown completion package, approved by the Design Authority (DA), and maintained in the CSB project files.

2.0 AS-BUILT VERIFICATION PROCESS

The as-built verification process will be performed in accordance with AP 6-012-00 and this plan. The purpose of the as-built verification activity is to verify that the contractor (MOWAT)/(POWER CITY) red-line drawings reflect the actual completed field installation within specified tolerances. The MHM Design Authority will conduct an initial meeting with the field walkdown team to assure a successful as-built verification process.

The walkdown team will use a sampling of the MOWAT redlines AND FCR'S that reflect the of the DESIRED CONSTRUCTION CONDITION OF THE CSB MHM.

At the completion of the field data collection process, the field data will be compared to the contractor red-line drawings to verify that the red-line drawings reflect the as-installed field conditions.

When a discrepancy between the design documents and the as-constructed condition is identified, the discrepancy will be verified and a Nonconformance Report (NCR) or other appropriate documentation will be prepared. This may also result in a Design Change Notice (DCN) or Request for Information (RFI). Discrepancies in the red-line drawings will be also be brought to the attention of FW and the CSB Project Manager.

3.0 FIELD WALKDOWN TEAM

The field walkdown team is appointed by the CSB Design Authority and consists of the following CSB Project personnel:

Team Lead – M.K. MAHAFFEY (MHM Support)

Quality Assurance – T.Z. (KING) ANDERSON

INSTRUMENTATION AND CONTROL - R. GARRISON
Walkdown personnel are responsible for:

1. Field walkdowns and data collection.
2. Coordinating with the Construction Manager (John Koberg) to arrange assistance and clearance to the facility as required to support data collection.
3. Performing work in strict compliance with this plan.
4. Complying with all applicable Health Protection, and Safety procedures required to perform this task.
5. Ensuring that they understand all information contained in this plan prior to performing their assigned tasks.

Craft personnel will provide access to closed panels, electrical cabinets, or other enclosures as needed, and function as walkdown personnel when assigned.

At no time is the field verification team to perform any actions which would endanger personnel safety. These include:

- Climbing on structures to observe SSCs that are not accessible at floor level. NOTE: CURRENT LADDER TRAINING REQUIRED FOR MHM ACCESS.
- Opening or collecting data from inside electrical cabinets, or other enclosures prior to having the system locked out by authorized personnel in accordance with applicable lock and tag procedures.
- Standing on piping insulation, ducting, struts, snubbers, conduits or raceways.

4.0 ITEMS TO BE FIELD VERIFIED

The SSCs have been selected for as-built verification based on a graded approach i.e. SAFETY CLASS, Safety Significant (SS) and General Service (GS) SSCs are represented in the list of
items to undergo as-built verification. The overall acceptance/rejection criteria will be conformance to the applicable drawings and design documents.

CONSTRUCTION OF THE MHM IS COMPLETE AND TESTING IS ALSO COMPLETE. NO CONSTRUCTION OR TESTING HOLD POINTS ARE REQUIRED.

A list of the MHM SSCs that will undergo as-built verification in accordance with this plan is shown below.

- **BRIDGE ASSEMBLY** - D35205, SHT 1, REV C
- **TROLLEY INSTALLATION AND ASSEMBLY** - D34942, SHT 1, REV F
- **TURRET ASSEMBLY INCLUDING SHIELD SKIRT** 362A0551, SHT 1, REV F, SHT 2, REV D
- **JOHNSON BRIDGE CLAMPS** - C-35640, SHT 1, REV B
- **HOIST ASSEMBLY & RIGGING** - 362A0578, SHT 1, REV B
- **EXTRACT SYSTEM** - 362A0863, SHT 1, REV D
- **INSTRUMENTATION AND CONTROL PANEL INSTALLATION ON TROLLEY**, D-34960, Rev B

Additional items may be added to the list at the discretion of the walk-down team OR BY THE DESIGN AUTHORITY either prior to or during the walkdown.

DESIGN MEDIA USED SHALL BE THE CONSTRUCTION PACKAGE DRAWINGS AND FIELD CHANGE REQUESTS (FCR'S) GENERATED IN RESPONSE TO SDR'S AND RFI'S.
## MHM Walkdown Checklist
### March 14, 2000

<table>
<thead>
<tr>
<th>Turret Assembly 362A0551, Sheet 1</th>
<th>Yes</th>
<th>No</th>
<th>NCR</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collision Avoidance Bumper installed</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Shield Skirt in place</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Personnel screens in place</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Ladders installed</td>
<td>X</td>
<td></td>
<td></td>
<td>No Permanent Safe Access to platform ladder under trolley turntable provided by MHM Supplier for maintenance activities. NOTE: maintenance access by step-ladder.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turret Assembly 362A0551, Sheets 1 &amp; 2</th>
<th>Yes</th>
<th>No</th>
<th>NCR</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plug Hoist Hand wind locked out</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Plug hoist jack screw seal visibly intact</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MCO Hoist Assembly 362A0578, Sheet 4</th>
<th>Yes</th>
<th>No</th>
<th>NCR</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MCO Hoist Hand wind locked out</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Dual rope reeving complete</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Shock absorbers installed</td>
<td>X</td>
<td></td>
<td></td>
<td>Not able to visually verify. Access restricted Mowat installation work package verified shock absorbers when wire rope was installed.</td>
</tr>
<tr>
<td>4. Maintenance covers installed</td>
<td>X</td>
<td></td>
<td></td>
<td>Note: Drum &amp; drive assy covers since replaced.</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>Missing sight glass. Note: Sight glass later replaced by Installer.</td>
</tr>
<tr>
<td>5. MCO Hoist Couplings made up</td>
<td>X</td>
<td></td>
<td></td>
<td>FFS:NCR W379-5 Extra bushing. Deferred to JCS WP 1S-00-076</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extract System 362A0863, Sheet 1</th>
<th>Yes</th>
<th>No</th>
<th>NCR</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Component labels in place (BF1, BF2, BF3)</td>
<td>X</td>
<td></td>
<td></td>
<td>Removed for test-present Note: Replaced later.</td>
</tr>
<tr>
<td>2. DOP Test connection in place</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Fan Ducting in place and guards installed</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Sample monitoring connection installed</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

October 2000
<table>
<thead>
<tr>
<th>Johnson Clamp System C-35640</th>
<th>Yes</th>
<th>No</th>
<th>NCR</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hydraulic fluid installed</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Hydraulic piping per drawing</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Reservoir not leaking</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Shim on clamps in place</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Lubrication fittings accessible</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Uplift restraints engaging rail</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
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<table>
<thead>
<tr>
<th>Bridge D-35205</th>
<th>X</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>1. Personnel ladders in place</td>
<td>X</td>
<td>West end trolley maintenance platform. Note: deleted by FCR 1015 and dwg H2-828583 Rv.0</td>
</tr>
<tr>
<td>2. Bridge festoon installed on wall</td>
<td>X</td>
<td>Not per Ederer Drawing – see FDI DCN-297</td>
</tr>
<tr>
<td>3. Limit switches on East End truck</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4. X-restraint pockets welded on A and B Girders (25 each)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5. Trolley festoon installed on South side</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trolley Assembly and Control Panel Installation D34942 &amp; D-34960</th>
<th>Yes</th>
<th>No</th>
<th>NCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Turret festoon installed</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Control panels located per drawing</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Handrails and personnel platforms in place</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Uplift restraints in place and overlapping beam</td>
<td>X</td>
<td></td>
<td></td>
</tr>
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</table>
AS-BUILT VERIFICATION PLAN

SPENT NUCLEAR FUEL

CANISTER STORAGE BUILDING

MCO HANDLING MACHINE

Electrical

Rev 0A
April 5, 2000

Approved:

C.E. Swenson  4/5/00

A.S. Daughtridge, Jr.  4/5/00
CSB MHM AS-BUILT VERIFICATION PLAN

1.0 INTRODUCTION

This as-built verification plan outlines the methodology and responsibilities that will be implemented during the as-built field verification activity for the Canister Storage Building (CSB) MCO HANDLING MACHINE (MHM). This as-built verification plan covers THE ELECTRICAL PORTION of the CONSTRUCTION PERFORMED BY POWER CITY UNDER CONTRACT TO MOWAT.

The as-built verifications will be performed in accordance Administrative Procedure AP 6-012-00, Spent Nuclear Fuel Project As-Built Verification Plan Development Process, revision 1. The results of the verification walkdown will be documented in a verification walkdown completion package, approved by the Design Authority (DA), and maintained in the CSB project files.

2.0 AS-BUILT VERIFICATION PROCESS

The as-built verification process will be performed in accordance with AP 6-012-00 and this plan. The purpose of the as-built verification activity is to verify that the contractor, Foster Wheeler, as-builts, (MOWAT)/(POWER CITY) red-line drawings and unincorporated FCR's 1002, 1005, 1006 and 1010 reflect the actual completed field installation within specified tolerances. The MHM Design Authority will conduct an initial meeting with the field walkdown team to assure a successful as-built verification process.

The walkdown team will use a sampling of the electrical as-builts, FCR's and MOWAT redlines that reflect the DESIRED CONSTRUCTION CONDITION OF THE CSB MHM. At the completion of the field data collection process, the field data will be compared to the contractor red-line drawings to verify that the red-line drawings reflect the as-installed field conditions.

When a discrepancy between the design documents and the as-constructed condition is identified, the discrepancy will be verified and a Nonconformance Report (NCR) will be prepared. This may also result in a Design Change Notice (DCN) or Request for Information (RFI). Discrepancies in the red-line drawings will be also be brought to the attention of FW and the CSB Project Manager.

3.0 FIELD WALKDOWN TEAM

The field walkdown team is appointed by the CSB Design Authority and consists of the following CSB Project personnel:

Team Lead – M.K. MAHAFFEY (MHM Support)

Quality Assurance – Scott Moss
Walkdown personnel are responsible for:

1. Field walkdowns and data collection.
2. Coordinating with the Construction Manager (John Koberg) to arrange assistance and clearance to the facility as required to support data collection.
3. Performing work in strict compliance with this plan.
4. Complying with all applicable Health Protection, and Safety procedures required to perform this task.
5. Ensuring that they understand all information contained in this plan prior to performing their assigned tasks.

Craft personnel will provide access to closed panels, electrical cabinets, or other enclosures as needed, and function as walkdown personnel when assigned.

At no time is the field verification team to perform any actions which would endanger personnel safety. These include:

- Climbing on structures to observe SSCs that are not accessible at floor level. NOTE: CURRENT LADDER TRAINING REQUIRED FOR MHM ACCESS. A temporary ladder is also required for access to the plug hoist maintenance area.

- Opening or collecting data from inside electrical cabinets, or other enclosures prior to having the system locked out by authorized personnel in accordance with applicable lock and tag procedures.

- Standing on motor housings, piping insulation, ducting, struts, snubbers, conduits or raceways.

4.0 ITEMS TO BE FIELD VERIFIED

The SSCs have been selected for as-built verification based on a graded approach i.e. SAFETY CLASS, Safety Significant (SS) and General Service (GS) SSCs are represented in the list of
items to undergo as-built verification. The overall acceptance/rejection criteria will be conformance to the applicable drawings and design documents.

CONSTRUCTION OF THE MHM IS COMPLETE AND TESTING IS ALSO COMPLETE. NO CONSTRUCTION OR TESTING HOLD POINTS ARE REQUIRED.

A list of the MHM SSCs that will undergo as-built verification in accordance with this plan is shown below.

- GEC wiring as shown on 363A0033 Sheet 1, Rev C
- MHM Power distribution system shown on 363A0030 Sheets 1-2
- Turret festoon shown on EB-35907, Sheet 1, rev D
- Control Console wiring as shown on EC-35900 sheet 6, Rev G, Sheet 11, Rev E
- X-Channel Power Panel as shown on ED-33065, Sheet 1, Rev J
- Trolley and Turret Rotate control panel as shown on ED-33068, sheet Rev J and EB-33056, Sheet 19, Rev K
- TV Camera system as shown on EB-33056, Sheet 2A, Rev K and 363A0033 Sheet 6, Rev E
- MCO Weight System as shown on EB-33056, Sheet 11, Rev N and EC-35900, sheet 10, Rev D

Additional items may be added to the list at the discretion of the walk-down team OR BY THE DESIGN AUTHORITY either prior to or during the walkdown.

DESIGN MEDIA USED SHALL BE THE AS Built ELECTRICAL DRAWINGS PROVIDED BY GEC AND EDERER FROM FOSTER WHEELER.
Electrical As-Built Verification Walk-down

MHM

Conclusions

Two electrical walk-downs were conducted of the MHM systems. The error rate on the as-built drawings was found to be on the order of 1-2% based on the number of electrical connections with the exception of the Ederer depiction of the GEC interconnections. Results and discrepancies identified in the two reviews are presented below.

Electrical Walk-down I April 13, 2000

An electrical walk-down was performed on April 13, 2000. Mike Mahaffey, Rick Garrison and Marion Fairchild participated with Steve Connor, Electrician. The review included opening various junction boxes and control panels and verifying wire numbers. In accordance with the approved verification plan, areas were selected where a drawing review had shown inconsistencies in the various as-built drawings. In general, with the exception of the Ederer interconnection diagrams, the drawings were found to match the as-built conditions with an estimated 1-2% accuracy. Deviations and suggested resolutions are listed below.

363A0033, Wiring Diagram Tube Plug Hoist and EB-33056 Sheet 16

Condition 1: Labeling of wiring for Tube Plug Hoist Brake, Location of Brake Rectifier

Wiring for the tube plug hoist brake was examined in JB 25X, JB05X and JB19x as well as the turret festoon. The GEC drawing shows PHB1 and PHB2 for wiring to the rectifier. The elementary shows 1601X and 102X through the festoon to the rectifier and PHB1 and PHB2 to the brake with PHB2 grounded. In the field examination of JB25X, which contains the rectifier, we found no labels on the wire from the rectifier to the brake. The wires going from JB25X to JB05X are labeled PHB1 and PHB2. The wires from JB05X to JB19X are labeled PH1 and PH2. In JB 19X PHB is changed to 1601X and PHB2 is changed to 102X. At the other end of the festoon in JB253P 1601X changes back to PHB1. It is recommended that the field wiring numbers (JB25X, JB05X and JB19X) and GEC drawing be revised to match the elementary. Also the MCO Hoist and Plug Hoist control panel as-built shows the rectifier in the panel and this should be deleted from the panel.

EB-35411 Mainline Festoon System, EB-33056 Sheet 1

Condition 2: Drawing Errors on Mainline Festoon

It was verified by opening the main disconnect that the incoming festoon power is labeled LL1, LL2 and LL3 instead of L1, L2 and L3 shown on the drawing. It is recommended that the festoon drawing and elementaries be revised to show the LL1, LL2 and LL3.

EC-35907 Turret Rotate Festoon System

Condition 3: Turret Festoon Drawing Not As-Built

JB253 C, I and P were opened to attempt to ascertain which wires went through each conductor. The P box was relatively open and the wire terminations were readable, however it was not possible to identify the source of the wires from the various conductors. Of the approximately 60 terminations, two problems were noted. 1601X changed to PHB1 and PHB2 originated in the junction box but did not continue through the festoon. This appeared to be erroneous. The C panel was reviewed to find 2A08X and 2A09X. The wires were found but congestion made tracing the wires impossible. The junction box was extremely congested and wire identification was not possible. It is recommended that the turret festoon drawing be updated using the wire termination list provided by Power City and appropriate wire numbers be changed. A map should be made of the control and instrument terminal strips in the junction boxes to identify where the wires are landed. This may require some temporary wire de-termination. The I box is really too small for the number of wires it contains.
ED-33068 Trolley and Turret Rotate Control Panel

Condition 4: Drawing Errors on Trolley and Turret Rotate Control Panel Drawing
The missing TSR relay was found in the panel with the expected wiring. The relay appears on the redline but was apparently inadvertently deleted during the as-building process. Three wiring changes were noted on the trolley drive, TSEL2 and TSJEX1. It is recommended the drawing to be revised to show the as-found condition, which is consistent with the elementaries. Spot checks of other components showed that the drawing in general reflects the as-built condition.

X-Channel Power Panel

Condition 5: Labeling Missing and Drawing Errors on X Channel Power Panel Drawing
The panel was found to contain unlabeled fuses MCFU1, 2 and 3 and the fuse capacity was found to match that specified on the elementaries. The capacity of the lighting transformers LTX1, 2 was found to be 250VA versus 300VA shown on the drawing. There were wiring number discrepancies found on relays L1, L2, PSF1R and CF1STR1, which is shown on the drawing as a 2. The drawing should be revised to correct these discrepancies which is consistent with the elementaries. Spot checks of other component wiring showed the drawing to be in general consistent with the as-built condition.

EC-35900 Sheet 11 MHM Console Back-sheet 2

Condition 6: Drawing Errors for MHM Console
The Ronan Power supply was found connected to the x input rather than the y consistent with the elementaries. The camera power supply (CAMPS) was also found in this panel and is not shown on the drawing. The drawing should be revised to show the as-found condition. Spot checks of the wiring for other components showed the wiring to be consistent in general with the drawing.

EC-35900 Sheet 6 MHM Alarm Indication Wiring

Condition 7: Drawing Errors and Omission on the MHM Alarm console
The Mode selection solenoid switch (MSSS) was found and wired as expected. The drawing should be revised to show the device. Wires to the camera focus and zoom were found to be 720X rather than 2A01X which appears on the elementaries. The elementary should be revised. Spot checks of other wiring showed the drawing in general reflected the as-found condition.

EC-35900 Sheet 10 MHM Console Backsheet #1

Condition 8: Drawing Errors on Elementary and MHM Console
The 1111BX on Trip Point relay 8X should be 1111B as shown on the elementaries. The console drawing should be revised. The CAMPS (Camera Power Supply) was not found in the console as shown on the drawing. The power supply was subsequently located by Rick Garrison in the right side of the console rather than the left. The terminal review of the wires confirmed the 720X and 2A06X were the correct numbers rather than those shown on the elementary. The elementary (sheet 2A) should be revised. Spot checks of the wiring on other components found the Panel drawing in general to be consistent with the as-built condition.

EB-33056 Sheet 2A, 363A0033 Sheet 6 Wiring Diagram Turret CCTV

Condition 9: Drawing Errors on Camera Control Circuitry
Junction Boxes JB19X and JB14X were examined in the field against applicable drawings. All of the connections in JB14X were found to be per the drawing with two exceptions.

Wire 707X was found to be 2A06X. This does not appear on the GEC drawings or the elementaries. It does show up on the interconnection diagrams and is part of the turret rotate festoon wire list. The GEC drawings and elementaries should be revised to show 2A06X. The coaxial connections were found to be per the elementaries. The elementary did not show the focus and zoom wires routed to the camera. The elementary also shows 2A01X rather than the 720X found on the control console. The elementary and GEC drawing should be revised to show the as-found condition.
A second electrical walk-down was conducted of the MCO hoist wiring and the Y-Channel wiring at the request of Project Management. New areas were selected from those not previously walked down in a somewhat random fashion without consideration of the results of the drawing review. The same error rate of approximately 1-2% was found. Mike Mahaffey performed the walk-down assisted by an electrician with the following results:

363A0033, Sheet 2 Wiring Diagram - Tube Plug Hoist
Condition 11: Drawing Error on GEC Connection Drawing for Tube Plug Hoist
The contents of JB20Y were reviewed against this drawing. All 9 wire numbers were correct. Wire terminal 48 was jumpered to 59 rather than 56 as noted on the drawing. Ederer spare wires were not terminated on terminals 51 through 55 but were coiled and wrapped in the panel. The GEC spare wires were terminated. The drawing should be revised to show terminal 59 rather than 56.

363A0033, Sheet 3 Wiring Diagram - Base Locking Pin
Condition 12: Missing Spare Wires on Elementary
The contents of JB20Y were reviewed against this drawing. Of the five wires shown, one was an unmarked spare. Wire numbers on the other terminals were correct. On the GEC drawing this wire is labeled 30A90Y and is from the unused contact on the proximity switch used to signal base locking pin engagement. The wire is not shown on the elementary drawing. It is recommended the wire be labeled and shown on the elementary (Sheet 30A).

363A0033, Sheet 5 Wiring Diagram - Tube Plug Grapple
Condition 13: Wire Labels in JB10Y
The 9 contacts in JB20Y were all checked and found to be correct. The 16 contacts in JB10Y were also checked. Wires on terminal 17 were mislabeled as 1521Y instead of the correct 15A21Y terminated in JB20Y. Wire labels should be changed. The 15 other wires were labeled correctly.

363A0033, Sheet 8 Wiring Diagram - MCO Hoist Equipment
Condition 14: Connection Drawing Shows Incorrect Resolver Wire Numbers
Wire numbers for the MCO Hoist Y resolver in JB20Y were found to be consistent with the elementaries. The GEC drawing should be revised to show 12H-72H. The other six wires were found to be correct.

363A0033, Sheet 11 Wiring Diagram - MCO Grapple
Condition 15: Wire Labels in JB20Y
Of the 13 wires terminated in JB20Y, 11 were found to be correct. GEC wire numbers on terminals 39 and 40 appear to be reversed in the as-found configuration. The Ederer side is correctly labeled. 39 should be 13B02Y and 40 is a spare 13B90Y. An attempt was made to trace the wiring to JB13XY but it was inside the hoist enclosure, which was buttoned up. The sensor potentially affected is the MCO Grapple Jaws Locked (Y) Limit Switch. Assuming the grapple has functioned correctly, the wire numbers should be reversed.

363A0033, Sheet 13 Wiring Diagram MCO Hoist Containment
Condition 16: Drawing Errors for Connection Drawing
Terminals in JB20Y for the weight sensing system were as expected. Wires for the MCO Hoist Containment Lighting system should be labeled on the drawing in accordance with the elementary (Sheet 14).
ED-3306 MCO Hoist and Plug Hoist Control Panel

**Condition 17: Errors on MCO Hoist and Plug Hoist Control Panel Drawing**

Various components in the panel were checked. Of about 60 wires, one was mislabeled on the drawing and one was shown connected to the wrong terminal on the MCO hoist flux vector drive (18 vs 19). The mislabeled wire was also identified during the drawing review. It is 5707X on MHL. The panel drawing should be revised. One of the relays (MHBFC1) has two sets of contacts in series instead of one set. This was found to be necessary due to limitations of the particular relay selected. The Plug Hoist Brake Rectifier is not located in the panel and should be deleted.

ED-33067 Bridge Control Panel Wiring Diagram

**Condition 18: Drawing Errors on Bridge Control Panel Drawing**

About 60 wire terminations were checked including one identified as inconsistent during the drawing review. On relay BFLT2, 2426X was found instead of 2425X on the drawing. 2426X is consistent with the elementary. The panel-wiring diagram should be changed. The two wires (2209X and 2219X) going to the flux vector drive faults for the Bridge drives were found on the normally closed instead of the normally open contact. The as-found condition is consistent with the elementary drawing. The panel drawing should be revised.

ED-33069 Y-Channel Main Power Panel Wiring Diagram

**Condition 19: Labeling Error and Drawing Error on Y-Channel Main Power Panel**

Approximately 60 wiring terminations from various components were checked. No discrepancies were noted. The elementary Sheets 38 and 40 show circuit breakers TSPCB1 and TSJCB1 respectively. On the panel drawing and in the panel the "1" is omitted from the drawing. The panel drawing and field labels should be changed.